

Update to the Implementation of an Integrated Interpretative Trail System in Cayo Icacos as a Management Strategy and an Environmental Education and Interpretation Initiative



Report Submitted to:
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Introduction

In recent years recreational SCUBA diving and snorkeling activities have increased and had become dramatically concentrated in coastal popular areas (i.e. MPA's, coral reefs). Coral reefs adjacent to tourist attractions, hotels and marinas are more vulnerable to such impacts. Unlike terrestrial recreational activities, snorkelers and divers are relatively free to scatter around an entire reef site because their movement is not constrained by the physical topography of the surrounding environment. Therefore, damage in particularly shallow grounds can be widespread as a result of lack of proper management, and poorly organized and/or supervised activities. The project is part of a major environmental education initiative that highlights the cultural, economic, social and environmental importance of the Natural Reserve. This specific project consists in the establishment of a Snorkeling Interpretative Trail, that will allow users and managers ordain the high volume of visitors and snorkeling activities in the coral reefs of Icacos Cay and provide an environmental education component to the common recreational activities. The Snorkeling Trail consists in the establishment of twenty (20) numbered buoys that without compromising their experience.

This project complies with the first four specific objectives of the Management Plan for Arrecifes la Cordillera Natural Reserve (RNAC in Spanish), namely:

- 1. In the short and medium term, increase environmental consciousness among the immediate community and visitors through the promotion and diffusion of environmental education about the RNAC resources.*
- 2. Take advantage of the available resources in the RNAC in a sustainable way by means of ordered and controlled recreational activities.*
- 3. Minimize the impacts of recreational activities to the ecosystem*
- 4. In the medium to long term, restore impacted ecosystems.*

In addition, this project fits the management needs identified in the Management Plan of the Reserve, as follows:

*CHAPTER VI: Identification of conditioning issues, Strategies, Goals and Objectives:
Section C: Strategies, goals and specific objectives*

*“GOAL: Preserve existing natural resources, and their scenic beauty, physical conditions, etc, **allowing its usage in a controlled manner** for scientific, education and recreational ends”*

CHAPTER VII: Action Plan

Phase II: Management

Section A: Restoration

Project 4: Renovation of coral communities

Section B: Conservation

Project 2: Rotulation of areas

Section: Activities for the usage of the area (recreational, educational and scientific)

Project 1: Zoning of the area for ordaining and control the usage and permitted activities in the Reserve

Project 5: Code of conduct for a sustainable usage and the enjoyment of visitors

Project 6: Install minimum facilities in Icacos Cay, necessary for recreational and educational activities

This report summarizes the necessary information in order to retake the permitting process for the establishment of the Icacos Interpretative Trail System. The proposed project area was visited on September 26, 2014 in order to assess current conditions.

Description

This project consists in the establishment of a Snorkeling Interpretative Trail, that will allow users and managers ordain the high volume of visitors and snorkeling activities in the coral reefs of Icacos Cay and provide an environmental education component to the common recreational activities. The Snorkeling Trail consists in the establishment of twenty (20) numbered buoys that will allow users to interact with educational information at 30 cm below water surface without compromising their experience. Each independent buoy will be anchored using a "duckbill" or "Manta" unit that will allow us to minimize the impact in the marine substrate. Each buoy is planned to be installed in sandy bottoms. The depth ranges from 6 feet to 12 feet. The Trail aims to provide a more structured mean of environmental enjoyment without compromising the user experience and the ecological integrity of the area. This project will add an environmental education and interpretation opportunity while releasing pressure from current unorganized activities over the coral reef. A graphic description is provided in figures 1-4.

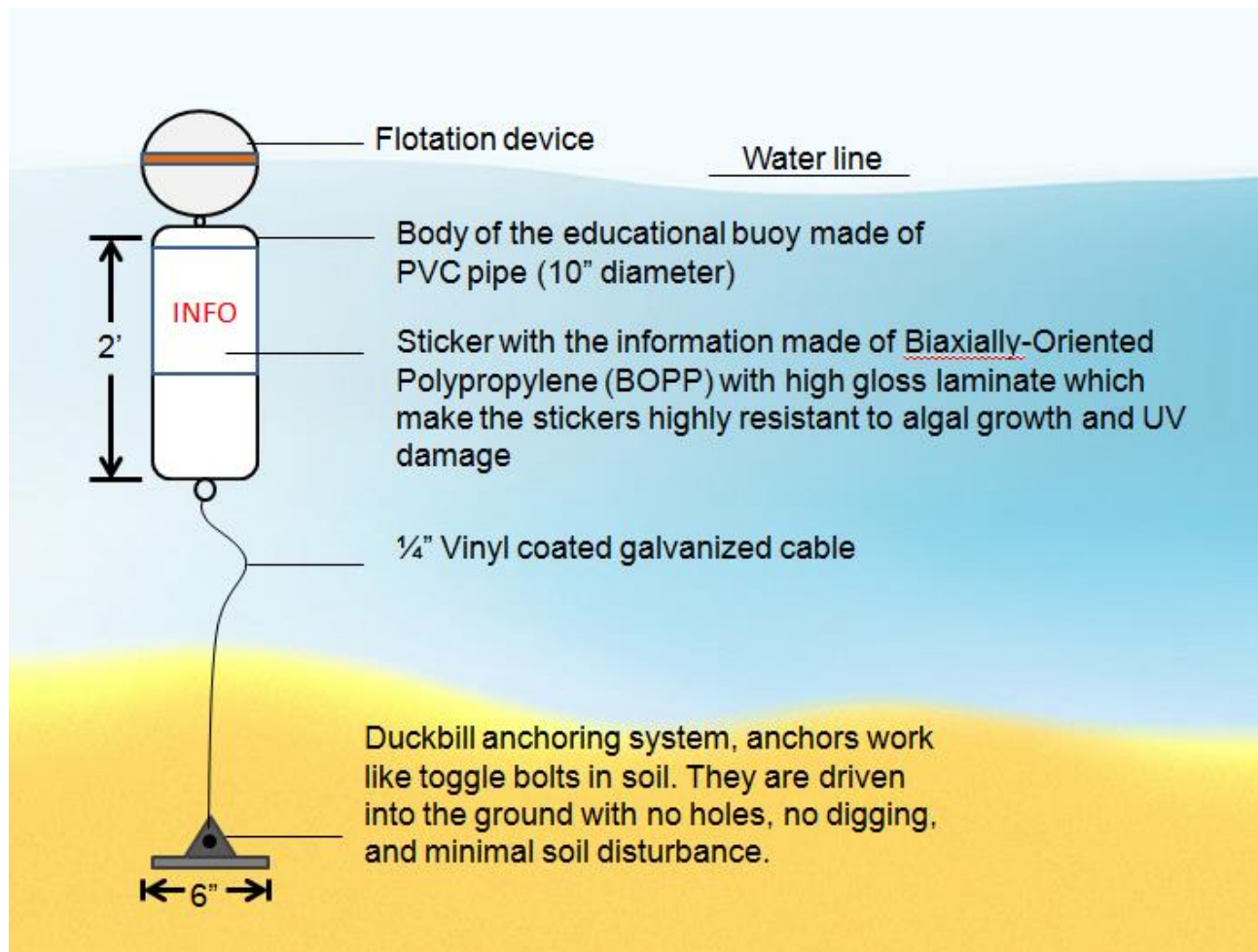


Figure 1: Detail of proposed buoy system

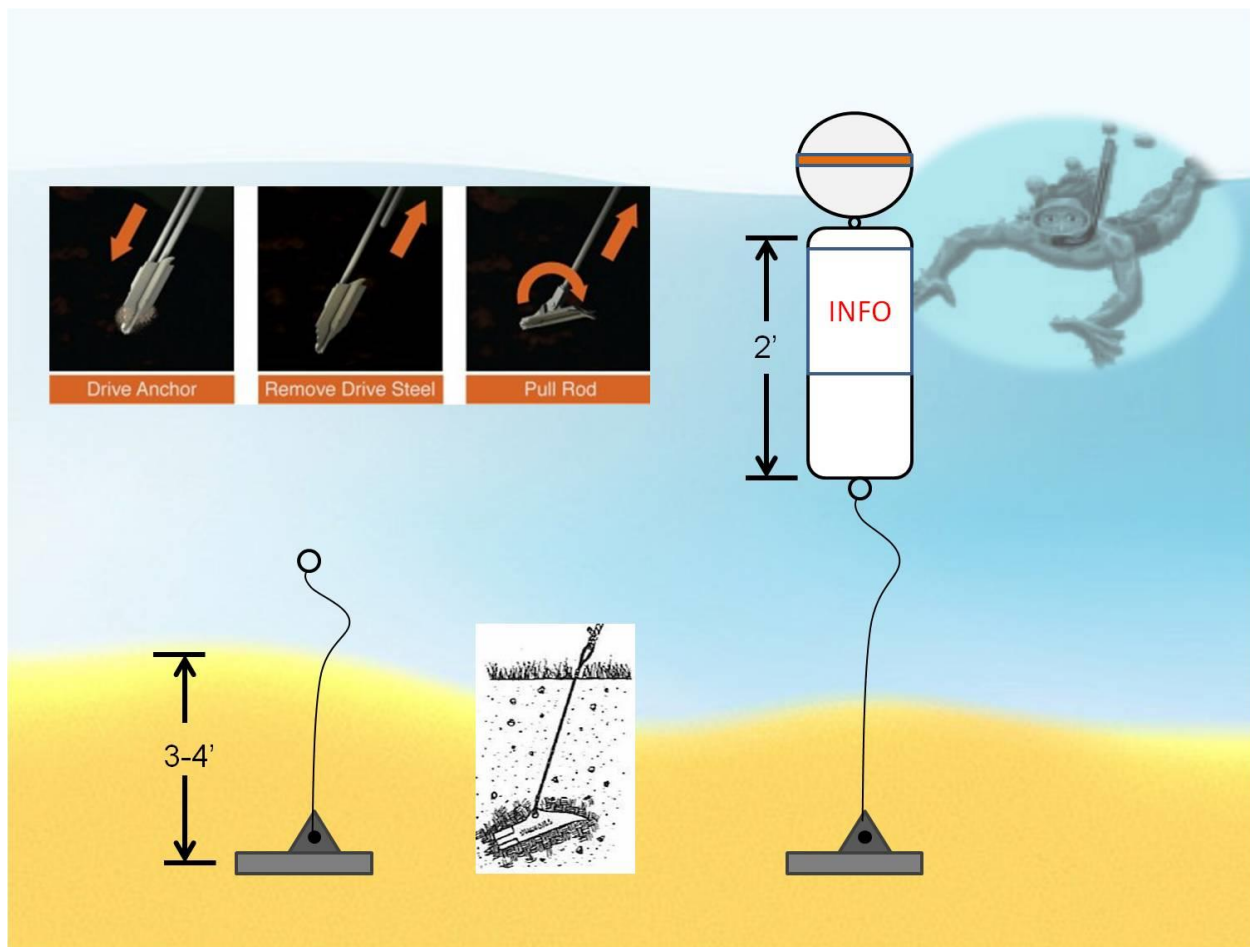


Figure 2: Detail of the proposed “duckbill” anchoring system and the buoy with the information close to the water-line.

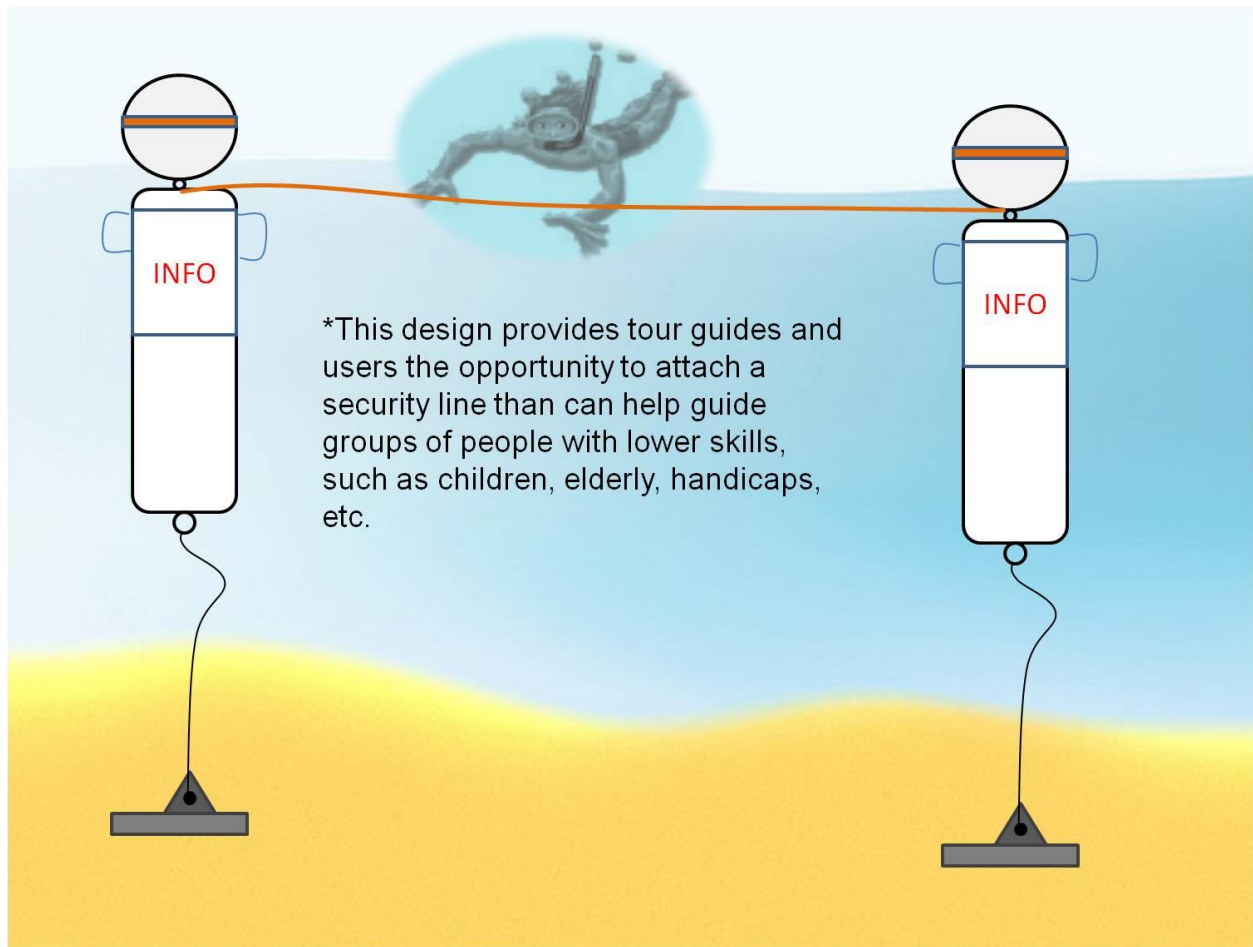
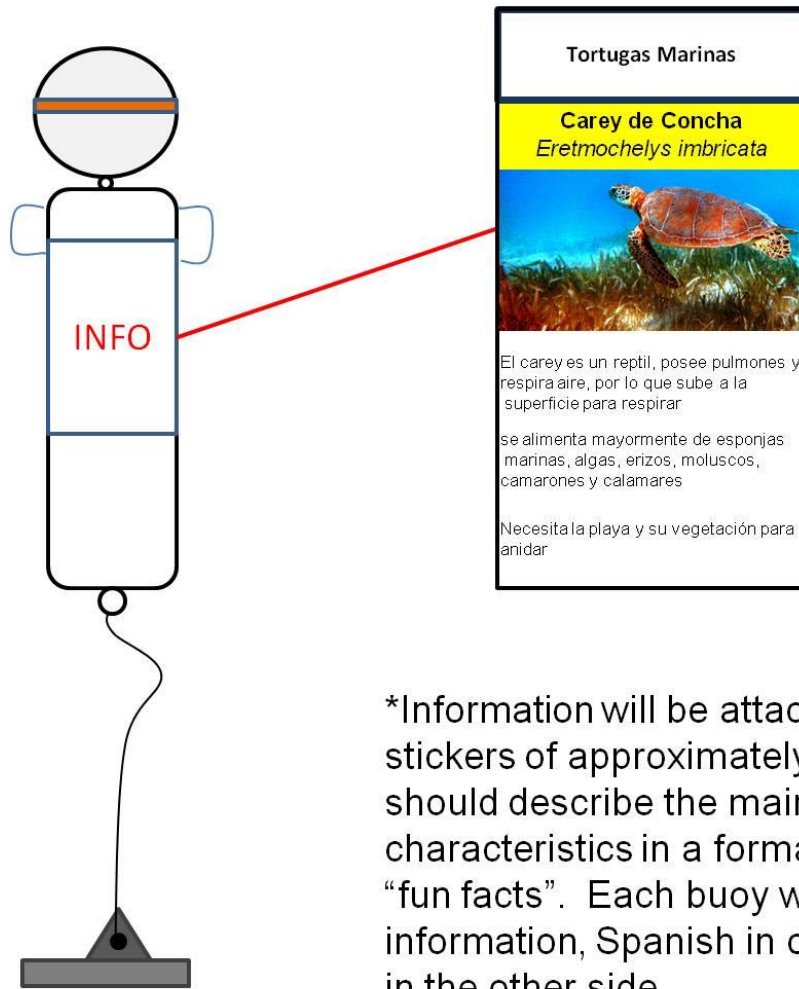


Figure 3: Detail of the proposed buoy system.



*Information will be attached to each buoy in stickers of approximately 12"x17". Each buoy should describe the main ecological characteristics in a format of bullets and/or "fun facts". Each buoy will have bilingual information, Spanish in one side and English in the other side

Figure 4: Detail of the proposed style to present the information.

List of Coordinates for the establishment of interpretative buoys

Buoy	Latitude	Longitude	Organism/display
1	18 23.039	65 35.336	Seagrass beds
2	18 23.069	65 35.340	Coral Reef
3	18 23.029	65 35.328	Dendrogyra cylindricus
4	18 23.020	65 35.322	Montastrea complex
5	18 23.016	65 35.316	Siderastrea siderea
6	18 23.004	65 35.305	Porites porites
7	18 23.000	65 35.299	Wave action
8	18 22.997	65 35.292	Seagrass degradation
9	18 22.994	65 35.285	Sea Turtles
10	18 22.993	65 35.277	Surgeon Fish
11	18 22.986	65 35.269	Parrot Fish
12	18 22.988	65 35.267	Damselfish
13	18 22.984	35 35.261	Acroporids
14	18 22.990	65 35.289	Warning buoy
15	18 22.996	65 35.300	Crabs
16	18 23.003	65 35.310	Fish & Seagrass
17	18 23.012	65 35.318	Sea Anemone
18	18 23.058	65 35.339	Soft Corals
19	18 23.110	65 35.368	Human Impacts
20	18 23.138	65 35.391	Community involvement

NMFS Section 7

Section A (Lead Agency)

Puerto Rico Department of Natural and Environmental Resources.

Section B (Project Location)

1. Location:

The project is located in Icacos Cay within Arrecifes la Cordillera Natural Reserve, which is off Eastern Fajardo. It is only accessible by boat

2. Latitude & Longitude:

Latitude: N 18 23.069 Longitude: W 65 35.340

3. Waterbody: Arrecifes la Cordillera Natural Reserve (Atlantic)

Section C (Project Description)

1. Existing Structures: N/A

2. Existing Conditions:

Environmental conditions at the site are those predominant in the Natural Reserve. Relatively healthy seagrass beds, abundant fish populations and 20-30% living coral cover. Water quality is variant, depending on heavy rainfall events in which the area receives influxes from the Fajardo River which has a long history of poor water quality, and high concentrations of nutrients, sediments and fecal bacteria indicators. Most of the time turbidity levels are low, which makes it a ideal place for recreational activities.

3. Seagrasses:

Whereas Seagrass is abundant throughout the Natural Reserve (*Thalassia*, *Syringodium*), this proposed project is located in an area where the seagrass patch is less than 10% of the total area. The proposed buoys are small and independent from each other, and the installation plan is to avoid completely any impact on the seagrass bed.

4. Mangroves: N/A

5. Corals: As shown in aerial image (Appendix 1) the whole project is away the coral patch north of the project. Our simple survey carried out September 26th, 2014 was consistent with previous works by Hernandez-Delgado (2010) and Garcia-Sais (2003). Relative living coral cover was nearly 20%, algal cover was 40%, and the resting 30% was sand-pavement-rubble. Assemblage was mostly constructed by *Porites astreoides*, *P. porites*, *Siderastrea radians*, and *S. siderea*. A couple of *Dendrogyra* colonies were present. Other common taxa such as *Diploria spp.* and *Millepora spp.* were present. The encrusting octocoral, *Erythropodium caribaeorum*, Zoanthids, particularly the encrusting, colonial form *Palythoa spp.*, and sponges were the other main biotic present. We found one isolated colony of *Acropora palmata*, which we didn't measure because of wind and current conditions. More detailed photos in **Appendix 1**

Section D (Project Construction Methods)

1. Methods: (Please provide account of construction methods)

This is not a construction project. Since most of the assemblage will be done previously to the installation process, there is no on-site construction needed apart from installing the anchoring systems. For the anchoring system it will be needed an air compressor for the use of a chipping hammer. All operations can be done with only one boat and it can take up to one week depending on weather conditions. The boat can anchor in sandy bottom and the hammering will be done by certified divers.

Section E (Effects of the Project)

1. Listed Species and Critical Habitat:

Since this is not a construction project, and due to the small scale nature of it; it is "Not likely to adversely affect" any listed species and or critical habitat.

2. Effects to Species:

"Not likely to adversely affect" any listed species

3. Effects to Critical Habitat:

Since this is not a construction project, and due to the small scale nature of it; it is “Not likely to adversely affect” any listed species and or critical habitat. It is expected that with the new information provided by the project the net effect is a better informed user that can lower the impacts on current habitat conditions.

Appendix 1



Figure 1. Project Location



Figure 2. Aerial image with detail. The proposed project is outside the coral reef and the seagrass patch.

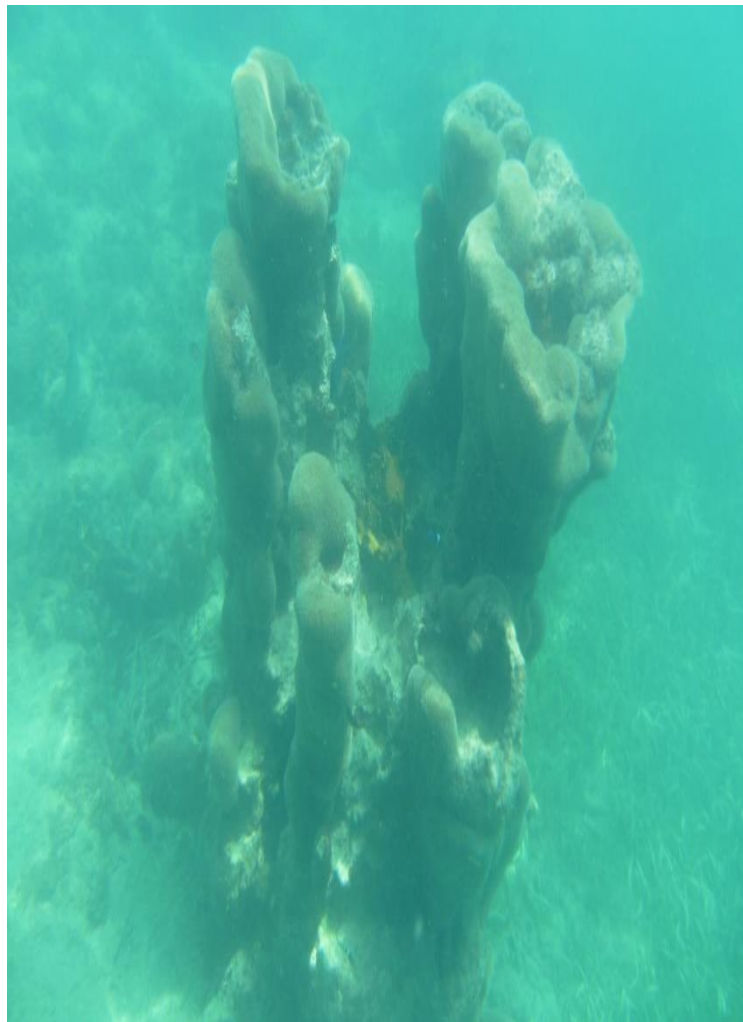


Figure 3. Sandy bottoms (top left), *Dendrogyra* colony (right), and a seagrass patch (bottom left) colony near the first 1-3 proposed buoys.



Figure 4. Example of a common composition in the reef habitat as viewed from the proposed installation distance (more than 10ft)

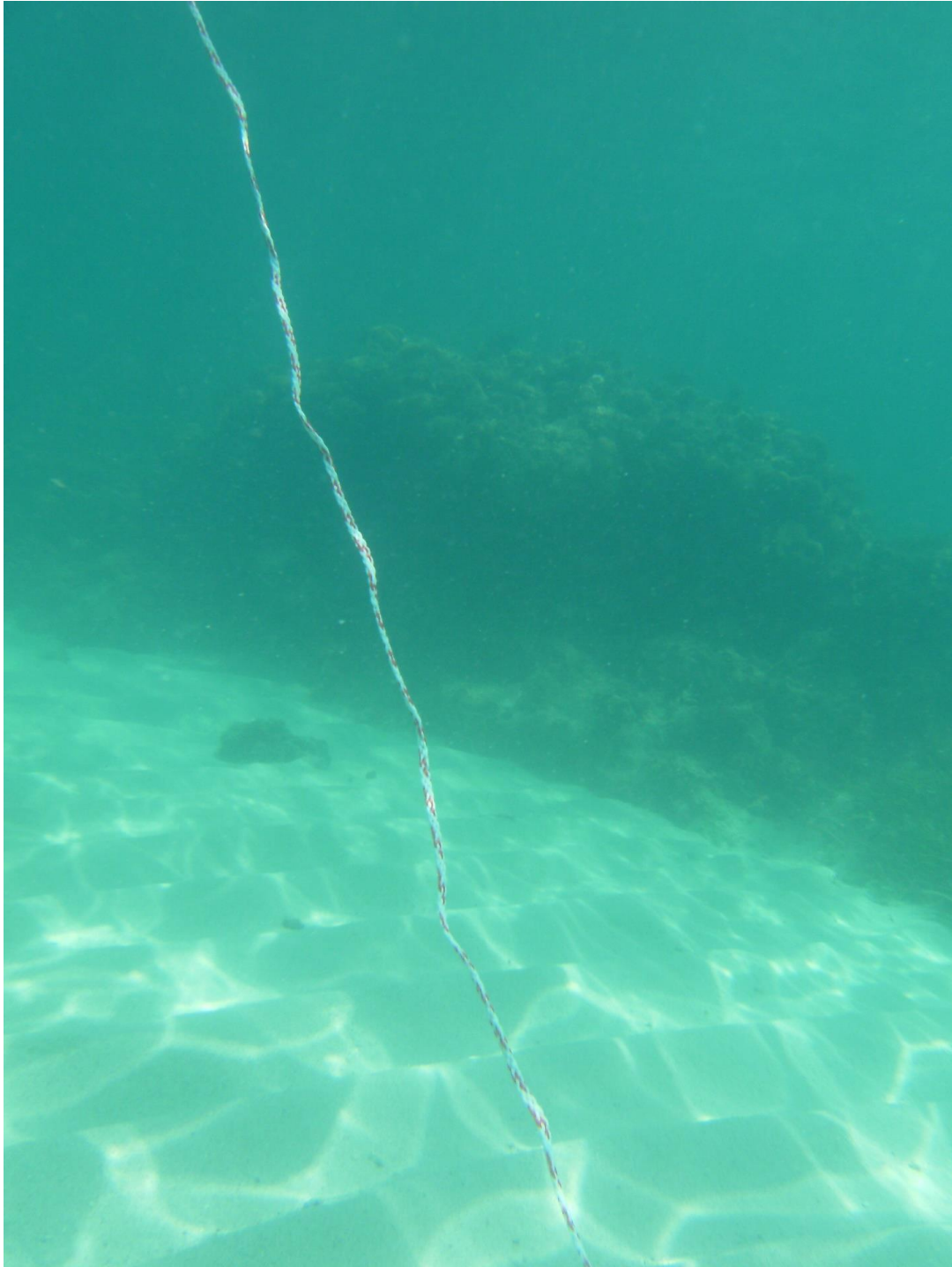


Figure 5. Most of the project will be installed in sandy bottoms, allowing safe distance from coral reef habitat